

INLAND NAVIGATION.

ICE IN LAKES AND RIVERS.

At Burlington, Vt., Lake Champlain was frozen on the 14th.

Saint Clair River.—On the 2d the ferryboat broke the ice in a narrow passage between Port Huron and Sarnia and the regular trips were resumed. High wind on the 4th caused the ice to move from the foot of Lake Huron, and the Saint Clair River was open from Port Huron to the Lake. Large quantities of floating ice were reported in the river on the 20th.

A report from Detroit, Mich., states that Lake Saint Clair was frozen over on the 1st; 5th, floating ice in river at Detroit; 15th, river frozen over, but ice broken by ferryboats; 20th, floating ice disappeared.

The entrance to the harbor at Grand Haven, Mich., was almost blocked by slush ice on the 9th.

Susquehanna River.—At Lock Haven, Pa., on the west branch of the Susquehanna, the river was frozen from the 1st to 6th, 11th to 13th, and 15th to 25th; ice was moving on the 26th and 27th. At Wilkes Barre, Pa., the river was frozen on the 1st.

Allegheny River.—On the 14th an ice gorge extended from Red Bank, 50 miles above Pittsburg, to above Parkers Landing; on the 16th the ice gorge at Red Bank was 9 miles in length and the ice was 6 to 9 feet in thickness; 18th, ice gorge remained unchanged; 20th, ice gorge broke about noon; 21st, ice from gorge passed Pittsburg in the morning.

At Pittsburg, Pa., floating ice was reported in the Monongahela River on the 1st, 2d, 5th to 7th, and 15th to 21st, and in the Allegheny River on the 1st, 5th to 8th, and 10th to 22d. A report from Parkersburgh, W. Va., states that drift ice from the gorge in the Allegheny River passed that place on the 22d and 23d. At Marietta, Ohio, floating ice was reported in the Ohio River on the 1st, 2d, 14th, and 17th to 19th.

The first boat of the season from Saint Louis, Mo., reached Havana, Ill., on the Illinois River, on the 28th.

Mississippi River.—At La Crosse, Wis., the ice was becoming very soft on the 20th; 26th, ice at the mouth of the Black River broke up in the early morning, and a channel opened in the ice at La Crosse. At Dubuque, Iowa, the ice began to break up on the 29th, but the river was gorged with ice below that place. At Le Claire, Iowa, the river was frozen from the 1st to 25th; the ice broke up on the 26th. At Muscatine, Iowa, the ice moved out of the river on the 25th. At Davenport, Iowa, the ice moved out on the 4th.

Missouri River.—At Pierre, S. Dak., the river was frozen over during the month. At Plattsmouth, Nebr., the river was clear of ice on the 24th. At Leavenworth, Kans., the river was clear of ice on the 3d; floating ice on the 8th, 11th, and 15th to 17th. At Saint Joseph, Mo., the river was blocked with ice from the 1st to 16th; 17th, ice running out of river; 18th, river clear of ice.

STAGE OF WATER IN RIVERS.

In the following table are shown the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, February, 1892 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River.</i>						
Shreveport, La.	29.9	29	11.6	8, 9	4.8	6.8
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	11	8.4	3, 4	3.1	5.3
Little Rock, Ark.	23.0	23, 24	11.7	3, 4	5.6	6.1
<i>Missouri River.</i>						
Fort Buford, N. Dak. *						
Kansas City, Mo.	21.0	29	9.7	4	5.6	4.1
<i>Mississippi River.</i>						
Saint Paul, Minn. *	14.0					
La Crosse, Wis. *	17.8					
Dubuque, Iowa *	16.0					
Davenport, Iowa †	15.0	16	8.0	28	4.7	3.3
Keokuk, Iowa †	14.0	10	6.8	22, 23, 24	1.3	5.5
Saint Louis, Mo.	30.0	21	17.5	1	6.7	10.8
Caïro, Ill.	40.0	24, 25	32.5	6	17.5	15.0
Memphis, Tenn.	33.0	27	24.2	8	12.6	11.6
Vicksburg, Miss.	41.0	29	32.8	12	21.1	11.7
New Orleans, La.	13.0	29	11.5	14, 15	7.7	3.8
<i>Ohio River.</i>						
Parkersburgh, W. Va.	38.0	23	19.3	3	6.0	13.3
Cincinnati, Ohio.	45.0	12	29.6	2	13.9	15.7
Louisville, Ky.	24.0	15, 27	11.9	2	7.7	4.2
<i>Chamberland River.</i>						
Nashville, Tenn.	40.0	21	17.2	7	5.8	11.4
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	10	11.5	7	5.3	6.2
Knoxville, Tenn.	29.0	9	6.5	5, 28, 29	2.3	4.2
<i>Monongahela River.</i>						
Pittsburg, Pa.	29.0	21	13.0	1	3.4	9.6
<i>Savannah River.</i>						
Augusta, Ga.	32.0	22	25.6	6	8.5	17.1
<i>Willamette River.</i>						
Portland, Oregon.	15.0	1	4.5	9	1.7	2.8
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	28	5.0	14	1.1	3.9
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	1	15.2	7, 8	5.8	9.4

* River frozen.

† For 23 days.

‡ For 27 days.

ATMOSPHERIC ELECTRICITY.

THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states, 11, on the 6th and 7th; in 9 on the 14th and 19th; in 6 on the 18th and 24th; in 5 on the 11th, 20th, and 28th; in 4 on the 4th, 13th, 23d, and 27th; in 3 on the 2d, 8th, and 9th; in 2 on the 15th, 21st, and 29th; and in 1 on the 1st, 3d, 12th, 16th, 17th, 22d, 25th, and 26th. No thunderstorms were reported on the 5th and 10th.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 13, in Missouri; on 12 in Texas; on 10 in Kansas; on 6 in Arkansas, Louisiana, Mississippi, Oklahoma Territory, and Tennessee; on 5 in Illinois and North Carolina; on 4 in Florida and Indian Territory; on 3 in Georgia; on 2 in Maryland, Michigan, New York, Pennsylvania, South Carolina, and Virginia; and on 1 in Alabama, Kentucky, Massachusetts, New Jersey, North Dakota, and Wisconsin.

West of the Rocky Mountains thunderstorms were reported in Arizona on the 1st, 3d to 8th, 12th, 13th, 14th, 24th, and 25th; in California on the 6th, 14th, 17th, 23d, and 24th; in Colorado on the 1st, 3d, and 21st; and in New Mexico on the 3d, 26th, and 27th. In states and territories other than those named no thunderstorms were reported.

AURORAS.

Exceptionally brilliant auroral displays were observed generally east of the middle-eastern and northeastern Rocky Mountain slopes and north of the 35th parallel on the 13th. The displays were noted at a number of stations in the morning. In the evening they were observed from 6 to 9 p. m., but occurred principally from 7 to 8 p. m., 75th meridian time. A display was reported at Micco, Fla., in the evening, but was not noted at stations intermediate between that place and the 35th parallel owing, probably, to cloudy weather.

Chart VII shows the limits of the region within which the displays were reported the evening of the 13th, and the period during which they were observed at the several stations. The following shows the more prominent features of the display at selected stations:

Auroral display of February 13, 1892.

Station.	Extent of display.		Remarks.
	Azimuth.	Altitude.	
Portland, Me	Covered 90	15	Color of arch bright red, with flashes to zenith.
Manchester, N. H.	In the NW.		Pink and crimson deepening to bright red, and beams of yellow and green; corona formed.
Northfield, Vt.	110 to 225	60	Rose color, with streamers.
Boston, Mass.	120 to 210	Zenith	Very brilliant at 7.45 p. m.
New York, N. Y.	140 to 220	35	Pale green changing to dull red.
Ithaca, N. Y.	125 to 195	80	Pink changing to red, with shafts of white light.
Philadelphia, Pa.	158 to 203		Brilliant red west of low arch of straw color.
Blue Knob, Pa.	135 to 180		Mass of red, with white arches and a red arch.
Baltimore, Md.	120 to 180	30	Varying brilliancy.
Washington, D. C.	135 to 215	30	Bright rosy red to deep crimson, with grayish bands, and streamers inclining slightly to northward.
Lynchburgh, Va.	155 to 205		An arch of red tinged with purple resting on a dark segment.
Charlotte, N. C.	95 to 105	25	Deep red, fan-shaped, with shafts of yellow.
Mico, Fla.	135 to 225	25	Arch of pale light changing to pink. Obscured by clouds at 7.30 p. m.
Parkersburgh, W. Va.	In the N.		Brilliant rose-colored streamers shot up from dark segment.
Cincinnati, Ohio.			Dull red glow in north obscured by clouds.
Cleveland, Ohio.	135 to 190	55	Color deep green to altitude 25°, with beams of bright corn color to altitude 55°.
Vevay, Ind.			Red and yellow streamers to the zenith.
Chicago, Ill.	135 to 225	55	Pink to deep red, with broad rays of white shooting upward.
Lexington, Ky.	155 to 192	46	Pale red, with white bands. Red in northwest.
Louisville, Ky.		30	Brilliant crimson.
Nashville, Tenn.	165 to 195	45	Rose color. Obscured by clouds.
Detroit, Mich.	In the NW.	90	Pink to crimson, with streamers to the zenith.
Port Huron, Mich.	90 to 270		Delicate pink to deep red, with white rays.

Auroral display of February 13, 1892—Continued.

Station.	Extent of display.		Remarks.
	Azimuth.	Altitude.	
Sault de Ste. Marie, Mich.	120 to 240	80	Dark red changing to pink.
Marquette, Mich.	90 to 180	90	Diffused light changing to rose red.
Grand Haven, Mich.	90 to 270	85	Rose red arch on dark segment, with white and pale pink streamers.
Milwaukee, Wis.	90 to 270	70	Dingy red changing to deep pink.
Saint Paul, Minn.	90 to 180	85	Purple glow resting on dark segment.
Saint Vincent, Minn.	90 to 270	90	Belt of red, with white streamers moving from west to east.
Duluth, Minn.	In the N.	90	Bright pink color.
Davenport, Iowa.	150 to 220	60	Bright purple to rosy red, with luminous beams and "merry dancers."
Saint Louis, Mo.	In the N.	30	Red changing to scarlet.
Huron, S. Dak.	90 to 215	90	Bright rose, with lighter beams.
Bismarck, N. Dak.	110 to 250	50	Reddish tint, with bright streamers.
Fort Assinaboine, Mont.	135 to 280		Occurred in morning. Parallel beams of purple and red.

Auroras were also reported as follows: 24th, in the Dakotas, Iowa, Wisconsin, and east New England. 25th, in east Montana, the Dakotas, Iowa, and Wisconsin. 26th, in east Montana, the Dakotas, Iowa, Wisconsin, Upper Michigan, and east New England. 29th, in east Montana, the Dakotas, Minnesota, Iowa, Wisconsin, and Upper Michigan. Auroras were noted along the trans-Atlantic steamship tracks east of the 40th meridian from the 14th to 17th. From the 22d to 28th, between N. 58°, W. 37° and N. 52°, W. 36°, nightly displays resembling a subdued twilight were reported. A white arch of altitude 25° to 30°, with streamers to altitude 45° generally appeared. The arch rested on a dark segment and stars were visible below, through, and above the arch. Auroras were also observed along the steamship tracks between the 30th and 50th meridians from the 24th to 27th.

STATE WEATHER SERVICES.

[*Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.*]

The following extracts and summaries are republished from reports for February, 1892, of the directors of the various state weather services:

ALABAMA.

Temperature.—The mean was 3.5 above the normal; maximum, 83, at Daphne, 4th and 23d; minimum, 18, at Valley Head, 13th; greatest monthly range, 53, at Healing Springs; least monthly range, 34, at Citronelle.

Precipitation.—The average was 1.55 below the normal; greatest monthly, 3.91, at Maysville; least monthly, 1.12, at Bermuda.

Wind.—Prevailing directions, northeast and southeast.—*P. H. Mell, Observer, Weather Bureau, Auburn, director.*

ARIZONA.

The month has been favorable for agriculture and cattle interests.

Temperature.—Maximum, 89, at Fort Mohave, 21st; minimum, 7, at Holbrook and Payson, 10th; greatest monthly range, 59, at Payson; least monthly range, 30, at Gila Bend.

Precipitation.—Greatest monthly, 5.34, at Farleys Camp; least monthly, 0.03, at Buckeye.

Wind.—Prevailing direction, west.—*J. C. Hayden, Observer, Weather Bureau, Tucson, director.*

ARKANSAS.

Temperature.—The mean was 5.2 above the normal; maximum, 78, at Texarkana, 7th; minimum, 18, at Rogers, 16th; greatest monthly range, 53, at Keesees Ferry; least monthly range, 32, at Newport.

Precipitation.—The average was 1.29 below the normal; greatest monthly, 6.50, at Madding; least monthly, 1.24, at Keesees Ferry.

Wind.—Prevailing direction, north.—*M. F. Locke, Commissioner of Agriculture, Little Rock, director; F. H. Clarke, Observer, Weather Bureau, assistant.*

CALIFORNIA.

Temperature.—The mean was 1.4 above the normal; maximum, 88, at Davisville and Claremont, 11th and 24th; minimum, 11, at Susanville, 9th; greatest monthly range, 50, at Winchester; least monthly range, 28, at Berkeley.

Precipitation.—The average was 0.46 below the normal; greatest monthly, 8.44, at Georgetown; least monthly, trace, at Citrus.

Wind.—Prevailing direction, west.—*J. A. Barwick, Observer, Weather Bureau, Sacramento, director.*

COLORADO.

Temperature.—The mean was 1.0 above the normal; maximum, 78, at Thon, 22d; minimum, —20, at Steamboat Springs, 25th; greatest monthly range, 76, at Thon; least monthly range, 39, at Fruita.

Precipitation.—The average was 0.30 above the normal; greatest monthly, 4.50, at Cumbres; least monthly, 0.04, at Lamar.

Wind.—Prevailing direction, west.—*W. S. Miller, Observer, Weather Bureau, Denver, director.*

FLORIDA.

Temperature.—Maximum, 89, at Manatee, 7th; minimum, 27, at Archer, 13th; greatest monthly range, 55, at Archer; least monthly range, 25, at Key West.

Precipitation.—Greatest monthly, 4.20, at Hypoluxo; least monthly, 0.24, at Ocala.

Wind.—Prevailing direction, northeast.—*E. R. Demain, Observer, Weather Bureau, Jacksonville, director.*

GEORGIA.

Temperature.—Maximum, 82, at Quitman, 8th; minimum, 18, at Diamond, 13th; greatest monthly range, 53, at Americus; least monthly range, 34, at Monticello.

Precipitation.—Greatest monthly, 5.98, at La Grange; least monthly, 1.93, at Hephzibah.

Wind.—Prevailing direction, northeast.—*Park Morrill, Local Forecast Official, Weather Bureau, Atlanta, director.*

ILLINOIS.

Temperature.—The mean was 4.9 above the normal of the last 17 years; maximum, 72, at Golconda, 24th; minimum, —3, at Lanark, 15th.

Precipitation.—The average was 0.35 below the normal; greatest monthly, 5.05, at Centralia; least monthly, 0.60, at Hennepin.

Wind.—Prevailing direction, northwest.—*John Craig, Observer, Weather Bureau, Springfield, director.*

INDIANA.

Temperature.—The mean was 5.0 above the normal; maximum, 70, at Marengo, 24th; minimum, 2, at Angola, 16th; greatest monthly range, 57,